

Pearl Fisheries of the Gulf of Kutch

BY

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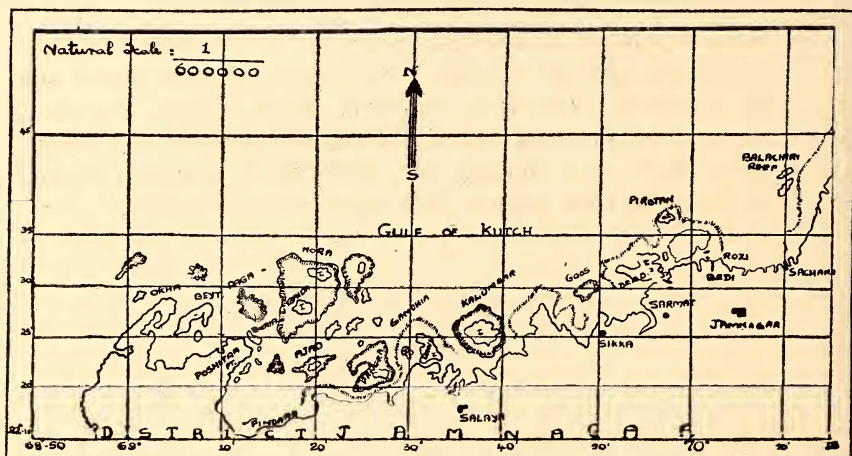
(With three text-figures)

INTRODUCTION

Pearl Fisheries, in the Gulf of Mannar, have been studied at length by many workers, but information on the age-old fisheries of the Gulf of Kutch is very scanty. Hornell (1909) mentions the rich pearl oyster reefs that are scattered along the coastline of the princely State of Nawarnagar and gives certain salient features of the pearl fishery of that State. Later, Gokhale, Easwaran & Narasimhan (1954) reviewed the pearl fisheries conducted by the then United States of Saurashtra in 1953. The works of Gokhale (1963), Narayanan, and Michael (1968) are the only additional information available. The authors, therefore, have attempted in the present work to enumerate the resources and the main features of the pearl fisheries of the Gulf of Kutch.

PEARL OYSTER REEFS

The pearl oyster reefs of the Gulf of Kutch—locally known as *Khaddas*—are scattered all along the southern coast, bordering the coastline of the Jamnagar District. There are about 42 important reefs



covering an area of 60,000 acres, from Jodiya ($22^{\circ} 42' \text{ N.}$, $70^{\circ} 16' \text{ E.}$) in the east and Ajad ($22^{\circ} 23' \text{ N.}$, $69^{\circ} 20' \text{ E.}$) in the west.

These reefs are not continuous but separated by sandy patches, mudflats and mangrove forests. A typical bed consists of a hard bottom of coral and rocky frame work, with an admixture of mud and sand. The important fauna of these beds are octopi, chanks, *Pinna* sp., globe fishes, mullets, rock perches, crabs, anemones, sea fans, sea lilies, tube dwelling polychaetes, brittle stars and sponges, while *Sargassum* and *Ulva* etc. form the common flora.

The Gulf of Kutch pearl oysters are of the species, *Pinctada fucata* (Gould) (= *Margaritifera vulgaris* Schumacher).

PEARL FISHERY

The pearl fisheries have been a State monopoly from time immemorial and are conducted once in three years. The fishery which lasts for three months starts just after the onset of the monsoon, which synchronises with the highest spring tides. Since the reefs are exposed during ebb tides, the fishermen enter the reefs and pick the oysters. These oysters are opened at the end of the camp by the fishermen, in the presence of the officials of the Fisheries Department and pearls removed.

Remuneration to the fishermen varied from time to time. Hornell (1909) reports that the fishermen received 1/8th of the value of the pearls in cash, 1/40th in cloth and 1/20th in food. In addition, two prizes were given to the two villages producing the most valuable collection of pearls. Later, the remuneration system was changed and the fishermen used to get 25% of the value of the pearls realised from the oysters collected by them. Since the fishermen were not satisfied with this system of payment, as their income depended, to a great extent, on luck, it was decided to pay Rs. 0.25 for every oyster collected by the fishermen, irrespective of whether the oyster contained pearls or not. This system is in vogue even today.

REVIEW OF THE PEARL FISHERIES

The pearl fishery of the Gulf of Kutch is quite small in magnitude, compared to that of Ceylon and Tuticorin. While the pearl oyster yield at Tuticorin and Ceylon in a fishery is to the tune of crores, it is only 30,000 on an average per fishery in the Gulf of Kutch. The maximum number of oysters harvested was 76,685 in 1916-17 and the minimum of 522 oysters in 1938-39. The details of the fisheries conducted since 1913 are incorporated in Table 1.

As seen from Table 1, the fishery had been either annual or bi-annual between 1913 and 1938. After 1938, there has been a gap of 3 to 5 years between every fishery. This step of increasing the gap between two consecutive fisheries has not improved the yield of oysters per fishery.

However, it appears that the Gulf of Kutch pearls are costlier and their pearl yielding capacity is more than those of the Gulf of Mannar. This is evident from the fact that while the value of 1000 oysters is only Rs. 25 in Tuticorin and Rs. 22 in Ceylon, it is about Rs. 250 in the Gulf of Kutch.

Unproductiveness and thinner population of oysters have been the main problems facing the pearl fisheries of the Gulf of Kutch. These handicaps are not peculiar to this area as uncertainty and irregularity in the oyster yield have been features of the pearl fisheries of the Gulf of Mannar also. Pearson (1927) records that in Ceylon, there were only 33

TABLE I

Year	Number of oysters harvested	Value of pearl realised in rupees
1913-14	33,171	7,503·00
1914-15	39,589	15,606·00
1916-17	76,658	14,550·00
1917-18	27,685	7,995·00
1919-20	29,951	14,487·00
1920-21	52,306	10,384·00
1921-22	17,526	6,208·00
1923-24	25,434	15,739·00
1926-27	33,816	28,320·00
1928-29	14,995	15,944·00
1930-31	38,527	10,470·00
1931-32	20,829	6,958·00
1934-35	34,326	12,489·00
1935-36*	9,685	2,344·00
1937-38	44,655	5,360·00
1938-39*	522	135·00
1943-44	37,321	61,693·00
1946-47	31,059	23,531·00
1950-51	32,441	23,000·00
1953-54†	11,519	13,530·00
1956-57	35,389	6,201·00
1960-61	3,922	6,005·00
1961-62	17,208	
1964-65	1,661	
1966-67	30,000	..

* One camp only

† Six camps

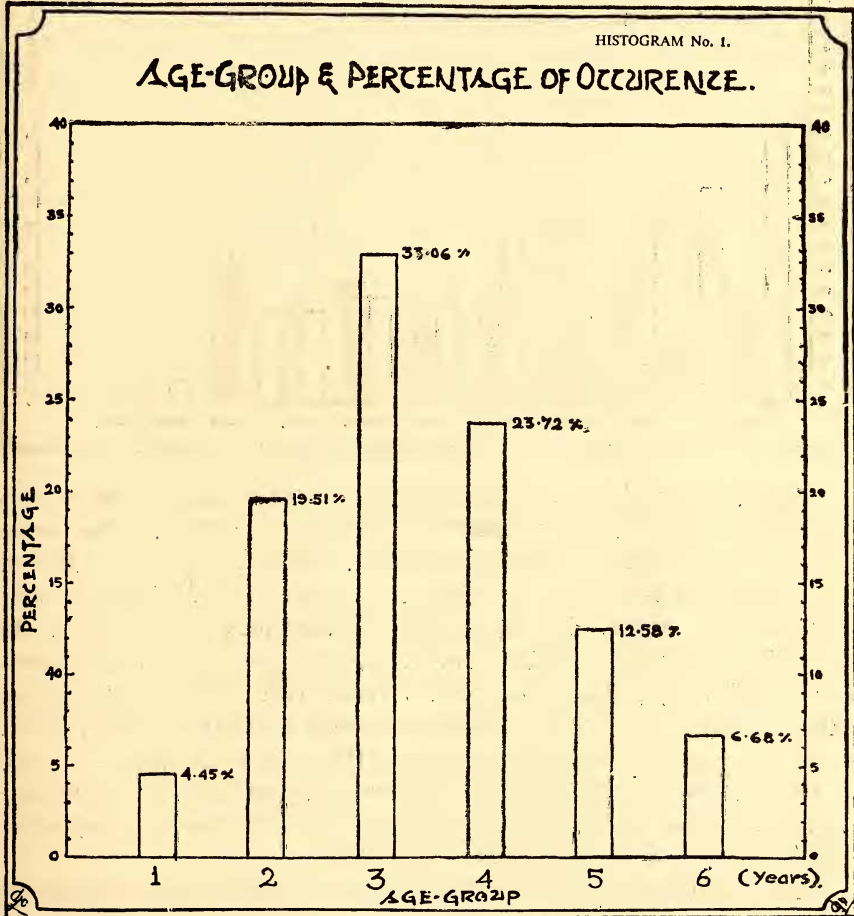
fisheries during the 19th century. On the other hand, there have been 23 fisheries in the course of the last fifty years in the Gulf of Kutch, but the yield of the oysters was comparatively very low.

SURVEY AND STUDIES

In order to estimate the stock of pearl oysters in the Gulf of Kutch, a random survey was conducted by the authors in 1964. An area of 3 sq. miles was surveyed at the rate of a quarter sq. mile each from twelve oyster beds in twelve days. 1661 oysters were collected from these

grounds. On an average, a sq. mile of oyster bed yielded 552 oysters, the maximum being 992 oysters from Pirotan Island.

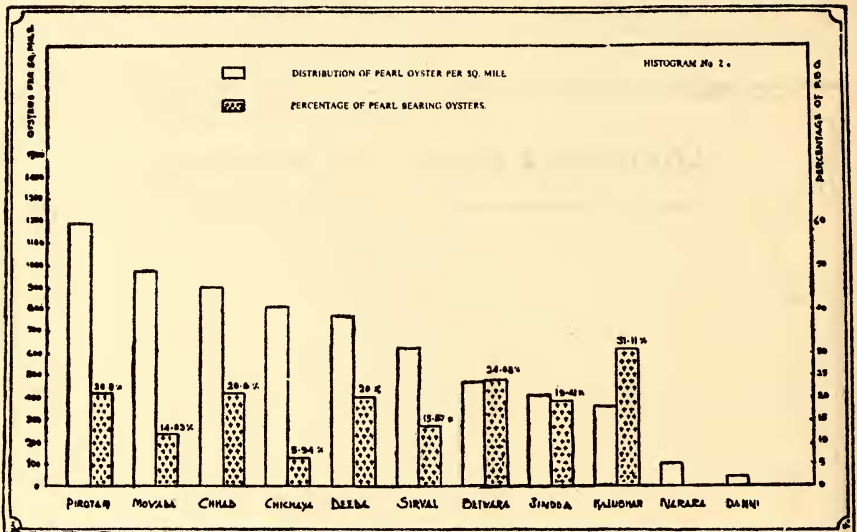
As shown in Histogram 1, three year old oysters dominated the stock (33.06%) followed by four year group (23.72%) and two year group (19.51%). The five year old oysters formed only 12.58% while the oysters above five years were only 6.68%. The percentage of oysters of one year age and below were quite low (4.45%).



As shown in Histogram 2, the percentage of the pearl bearing oysters is 18.47 on an average, the maximum being 31.11% from Kalumbar Reef and none from Narara and Danni. However, few oysters were collected from Kalumbar Reef.

The beds at Pirotan, Movada, Chhad, Chicheya, Deeda and Sirwal appeared to be comparatively more productive than Betwara, Jindhda,

Kalumbar, Narara and Danni, which were quite productive a decade and a half ago. Even in the richer beds the distribution of oysters was scanty. The oysters were not in groups or clusters, but were seen as single individuals widely separated from each other unlike in the 'Paars' of the Gulf of Mannar.



The mangrove forests, which are noted for their sand binding powers have been indiscriminately removed from the oyster reefs. (The stems are used for fuel and the leaves for fodder). This might have resulted in the siltage and deposition of sand in the oyster reefs. Also the very heavy currents of the Gulf have deposited sand on the oyster beds. In fact, Movada, Danni and Kalumbar Reef, which were quite productive a few decades ago, have since been covered with sand to a very great extent. Similar instances have been reported by Pearson (1927) that a large bed of oysters in Ceylon was lost in 1925, due to the action of sand.

With a view to study the causes of this comparatively thinner population and unproductiveness of the oysters, studies on the breeding habits of the oysters were undertaken by the authors.

About 600 oysters collected from the beds were reared in an enclosure in the littoral zone of Sikka coast and in a sea water tank at Sikka. In the former, wooden cages, measuring 3 ft. \times 3 ft. \times 6 in. with cubicles and wire gauze windows were used for keeping the live oysters, while in the latter metallic cages measuring 18 in. \times 12 in. \times 4 in., suspended from bamboo rafts were used. The growth rate and the gonadial changes in these oysters were observed periodically for two years. The oysters reared in the metallic cages were healthier and grew faster than the oysters confined in the wooden cubicles and those found in the natural beds. The

gonads were mature and oozing twice in a year, between October and December and March and May. This indicates that the oysters breed twice in a year. But there were no indications of any spat fall during these periods, for the cultch (metallic cages, bamboos, sea shells etc.) provided for this purpose in the area did not show any attachment of spats. Further, the plankton collected from these localities during these periods did not show the presence of oyster larvae or post-larval spats. Even in the natural beds, the authors failed to observe spats in large numbers except some stray cases here and there.

Devanesan & Chidambaram (1956) have commented that the proximity of the two sexes is essential for the oysters to spawn. Only when the oysters live in dense patches would the chances of spawning be greater resulting in abundant spat-fall. If the females are separated far apart from the males, the ova-shed may not reach the males to furnish them with stimulus to throw out the milt. If this were true, the chances of reproduction in the case of the Gulf of Kutch oysters is little, since the individual oysters are far apart from each other.

The authors have observed that the sexes of the oysters collected at random from the beds were not proportional. Sometimes, they were either exclusively males or females. The period of maturity of females rarely synchronised with that of males. This also may be a factor which has contributed towards the thinner population of the oysters.

According to Hornell (1922), the pelagic life of the pearl oyster larvae is 5 to 7 days, during which time, they are at the mercy of the tides and currents. In the Gulf of Kutch, the tidal levels fluctuate very greatly in the littoral zone where the oyster beds are located. It is, therefore, very likely that the larvae when formed are either destroyed during the low tides, when the reefs become exposed, or carried away by the outgoing tides to the deeper waters, where they may settle if the substrata are suitable, or perish. This is evident from the fact that the spat-fall in the vicinity of the pearl oyster beds in the Gulf of Kutch is very thin if not absent.

Hornell (1916) believed that the oysters found in the shallow waters are the stock from which the spats migrate towards deeper waters. It is quite probable that the oysters that are found scattered in the littoral zone of the Gulf of Kutch are the stock formed by stray spat-falls and the main stock is somewhere in the deeper waters. In that case, it is likely that the deeper waters of the Gulf of Kutch should have rich stock of pearl oysters. A survey of the deeper waters of the Gulf of Kutch by employing expert divers and by dredging have been proposed to the Government of Gujarat by the authors. It is hoped that the results of the survey would throw more light on the pearl fisheries of the Gulf of Kutch.

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